WORK AUTHORIZATION
Statement of Work (SOW)
San Jacinto River Waste Pits
CERCLIS No.: TXN000606611 Site ID: 06ZQ
September 18, 2014

1.0 PURPOSE. The purpose of this Work Authorization issued to the Mississippi Valley Division of the United States Army Corps of Engineers (USACE) under multi-site Interagency Agreement DW-96-95854901-0 between the Environmental Protection Agency (EPA) and the USACE is to provide technical support to EPA, including preparing an independent assessment of a Potentially Responsible Party's (PRP's) designs and submittals regarding the San Jacinto River Waste Pits Superfund Site (Site).

In general, this work will include an assessment of the design and evaluation of the remediation alternatives presented in the Feasibility Study, as well as an identification of any other remedial action alternatives or technologies that may be appropriate for the Site. Further, the technical assistance will include an assessment of flow/hydraulic conditions in and around the San Jacinto River, including an evaluation of the models used by the PRPs for the Site, and including the use of surface water hydrology model(s) appropriate for the Site.

2.0 BACKGROUND. The Site consists of several waste ponds, or impoundments, built in the mid-1960s for the disposal of paper mill wastes as well as the surrounding areas containing sediments and soils potentially contaminated by the waste materials that had been disposed of in these impoundments. The impoundments are located immediately north and south of the I-10 Bridge and on the western bank of the San Jacinto River in Harris County, Texas (see Figure 1).

Large scale groundwater extraction by others has resulted in regional subsidence of land in the vicinity of the Site resulting in exposure of the contents of the northern impoundments to surface waters. A time-critical removal action was completed in 2011 to stabilize the pulp waste material in the northern impoundments and sediments within the impoundments to prevent the further release of dioxins, furans, and other chemicals into the environment. The removal consisted of placement of a temporary armor rock cap over a geotextile bedding layer and an impermeable geomembrane in some areas. The total area of the temporary armor cap is 15.7 acres. The cap was designed to withstand a 100-year storm event.

The southern impoundments are located south of I-10 and west of Market Street, where various marine and shipping companies have operations 9see Figure 1). The area around the former southern impoundments is an upland area that is not currently in contact with surface water.

The members of the Project Delivery Team (PDT) listed in Section 2.2 below have provided technical assistance to the Site's Remedial Project Managers (RPM) for the past three years that consisted of 1) an evaluation of modeling performed by the PRP's modeling contractor, 2) review and comment on the draft Feasibility Study, and 2) an evaluation of the design of the temporary armor cap.

Figure 1: San Jacinto River Waste Pits Superfund Site

2.1 PROJECT POINT OF CONTACT (POCs).

Technical POC: Gary Miller, EPA Region 6, 1445 Ross Avenue, Suite 1200, Dallas, Texas 75202, Remedial Project Manager, 214-665-8318.
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2.2 PROJECT DELIVERY TEAM.

Technical POCs: Earl Hayter CEERD-EPW, Research Civil Engineer, 864-656-5942.
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3.0 SCOPE OF WORK. This section outlines the tasks that the PDT will perform to accomplish the requirements described in EPA's Work Authorization.

1. Select members of the PDT will travel to meet with the EPA RPM for planning purposes and to inspect the Site and to become familiar with the surrounding waters and watershed. Include one overnight trip to the San Jacinto River Waste Pits Site for not more than four persons.
2. Perform an assessment of the San Jacinto River flow/hydraulic conditions and river bed scour in and around the Site for severe storms, hurricanes, storm surge, etc., using surface water hydrology model(s) appropriate for the Site. In the assessment include an evaluation of potential river bed scour/erosion in light of the historical scour reports for the Banana Bend area and for the San Jacinto River south of the I-10 Bridge. The hydrodynamic and sediment transport model developed by Anchor QEA (AQ) should be modified as appropriate to perform this task.
3. Perform an evaluation of the models and grid cell sizes used by the PRPs for the Site, including a comparison of predicted velocities and bed shear stresses, and include a discussion of any uncertainties in the model results. The evaluation should include a review the model assumptions regarding bed shear stress, water velocities, and scour.
4. Provide an uncertainty analysis of the model assumptions (flow rates, boundary representation, sediment transport, sedimentation rates, initial bed properties, etc.). Uncertainties should be clearly identified and assessed including sediment loads at the upstream Lake Houston Dam. The uncertainties should be listed, and then the likely impact of these uncertainties on model results will be described. Last, an extensive sensitivity analysis should be performed on the five parameters that have the highest uncertainty.
5. Perform a technical review of the design and construction of the entire existing cap as it is currently configured, including an evaluation of the physical and chemical stability of the cap. Identify any recommended enhancements to the cap.
6. Assess the ability of the existing cap to prevent migration of dioxin, including diffusion and/or colloidal transport, through the cap with and without the geomembrane/geotextile present. This evaluation should assess the long-term dissolved and colloidal contaminant flux and potential impacts on the water column and ecological resources. In addition, the potential for loss of sediment beneath the armor cap should be assessed considering the ability of the cap to serve as a filter, and to restrict resuspension and bioturbation.
7. Assess the long-term reliability (500 years) of the cap under the potential conditions within the San Jacinto River, including severe storms, hurricanes, storm surge, subsidence, etc. Include in the assessment an evaluation of the potential for cap failure that may result from waves, prop wash, toe scour and cap undermining, rock particle erosion, substrate material erosion, stream instability, and other potential failure mechanisms. Reliability will be based on the ability of the cap to prevent any release of contaminated material from the Site. Also discuss any uncertainty regarding the long-term reliability and effectiveness of the existing cap. This task should be performed by developing a highly refined sub-grid model of just the cap and surrounding waters. This model should be run under a wide range of hydrodynamic conditions in an attempt to simulate the listed hydrologic/hydraulic events. Results from these model runs should be evaluated to assess the long-term reliability of the cap.

8. As part of the cap reliability evaluation, assess the potential impacts to the cap of any barge strikes/accidents from the nearby barge traffic. An assessment of the potential sediment losses from a barge strike should be perform and the short-term and long-term potential impacts on the water column and ecological resources should be evaluated.
9. Identify what institutional/engineering controls (e.g. deed restrictions, notices, buoys, signs, fencing, patrols, and enforcement activities) should be incorporated into the remedial alternatives for the TCRA area and surrounding waters and lands. Institutional and engineering controls applied for caps at other contaminated sediments sites should be reviewed for application at the TCRA area as well as the rest of the site north of I10.
10. Identify and document cases, if any, of armoring breaches or confined disposal facility breaches that may have relevance to the San Jacinto Site evaluation. A literature review should be conducted to identify locations where armor has been used on caps and confined disposal facilities and to determine any problems in the design, construction and performance of the armor.
11. Assess the potential amount or range of sediment re-suspension and residuals under the various remedial alternatives including capping, solidification, and removal. The potential losses from resuspension and erosion of residuals from active remediation for each remediation alternatives should be done in accordance with the techniques provided in the USACE Technical Guidelines for Environmental Dredging of Contaminated Sediments (2008).
12. Identify and evaluate techniques, approaches, Best Management Practices (BMPs), temporary barriers, operational controls, and/or engineering controls (i.e., silt curtains, sheet piles, berms, earth cofferdams, etc.) to minimize the amount of sediment re-suspension and sediment residuals concentrations during and after dredging/removal. Prepare a new full removal alternative(s) that incorporates the relevant techniques identified as appropriate. The controls and BMPs should be identified and evaluated to limit potential losses from resuspension and erosion of residuals from active remediation for each remediation alternatives in accordance with the techniques provided in the USACE Technical Guidelines for Environmental Dredging of Contaminated Sediments (2008).
13. Assess the validity of statements made in the Feasibility Study that the remedial alternative with removal, solidification, and placing wastes again beneath the TCRA cap has great uncertainty as to implementation and that such management of the waste will result in significant releases. The feasibility of the removal, solidification and containment alternatives should be reviewed for reliability, implementability, and constructability as well as short-term effectiveness.
14. Provide a model evaluation of the full removal Alternative 6N identified in the Feasibility Study as well any new alternative(s) developed under Task 12 (Identify and evaluate techniques …) above. Include modelling of sediment re-suspension and residuals. This evaluation should be performed using the refined model to be developed under Requirement 2. The model should be modified to represent the full removal Alternative 6N and run for the same series of flow conditions used to evaluate AQ's model as well as that for the cap under Requirement 7. If needed, any other new alternatives developed under Requirement 12 should be evaluated as well.
15. Evaluate floodplain management and impact considerations of construction, considering Alternatives 3N, 5aN, 6N, and any new alternative(s) developed under Requirement 12, in the floodplain and floodwaters pathway and how that would impact flood control, water flow

issues and obstructions in navigable waters. This includes impact on changes to potential flooding and any offsets that are needed due to displacement of the water caused by construction in the floodway (height or overall footprint) including effect at the current temporary TCRA cap and any potential future remedial measures.

16. Project the long term (500 years) effects of the capping alternative (3N) compared to the full removal alternative (6N) on water quality. This evaluation should assess the long-term dissolved and colloidal contaminant flux and potential impacts on the water column and ecological resources for capping the contaminated sediment and covering the dredging residuals. In addition, the potential for loss of sediment beneath the armor cap should be assessed considering the potential for deposition to enhance the armor cap performance by its ability to serve as a filter, and to restrict resuspension and bioturbation.
17. Assess the potential impacts to fish, shellfish, and crabs from sediment re-suspension as a result of dredging in the near term and for the long term. This evaluation should assess the bioaccumulation in fish, shellfish and crabs from the surficial sediment and water column contamination during dredging and its recovery following dredging.
18. Assess the potential for release of material from the waste pits caused by a storm occurring during a removal/dredging operation; and identify and evaluate measures for mitigating/reducing any such releases. This task should determine what protective measures, e.g., sheet piles, armor removal in sections, etc., should be constructed, if any, to prevent release of material from the waste pits during a removal/dredging operation caused by a 10-year storm.
19. Estimate the rate of natural attenuation in sediment concentrations/residuals and recommend a monitoring program to evaluate the progress. Discuss the uncertainty regarding the rate of natural attenuation. The rate of natural attenuation via net sedimentation should be estimated using the refined sediment transport model to be developed for Requirement 2. A limited sensitivity analysis will be performed to estimate the uncertainty in this rate, and a field program to evaluate this process should be described as well.
20. Assess the appropriateness of the preliminary sediment remediation action level of 220 ng/kg in consideration of the appropriate exposure scenario (recreational vs. subsistence fishing), and in consideration of an appropriate Relative Bio-Availability (RBA) factor; and recommend an alternative sediment action level as appropriate.
21. Communicate at least weekly with the EPA Remedial Project Manager (RPM) regarding progress and issues identified during the report review. Maintain all technical and financial records associated with this Work Authorization. Prepare and submit monthly progress reports and invoices to document monthly and cumulative cost, performance status, and technical progress.

4.0 DELIVERABLES.

1. Submit progress reports and invoices to the EPA RPM for each month no later the 15th day of the following month.
1. Submit a report to the EPA for Tasks 2 through 6 within 11 weeks of initiation of this Work Authorization.
2. Submit a report to the EPA for Tasks 7 through 14 within 17 weeks of initiation of this Work Authorization.

3. Submit a report to the EPA for Tasks 15 through 20 within 23 weeks of initiation of this Work Authorization.
4. Provide technical support to EPA, including preparation of technical memorandums regarding the above issues during the Period of Performance.

5.0 EPA RESPONSIBILITIES. EPA is responsible for providing the QA modeling system (including computer codes and input files) to ERDC. The work on Requirements 2-4 cannot begin until this is delivered.

6.0 USACE TECHNOLOGY/FOCUS AREA. ERDC-EL, Environmental Processes and Engineering.

7.0. PERIOD OF PERFORMANCE. It is anticipated that this Work Authorization will cover a time interval of approximately 18 months, or until March 31, 2016.

8.0 SECURITY. Information produced in this study is unclassified.